```
In[95]:=  LagrangeInterpolation[xi_, fi_] := Module[{n, L, poly},

          n = Length[xi];

          If[n ≠ Length[fi],
           Print["List of points and function's values are not of same size"];
           Return[];
          ];

          (* L_k(x) *)
          L[k_, x_] := Product[
            If[j == k, 1, (x - xi[[j]])/(xi[[k]] - xi[[j]])],
            {j, 1, n}
           ];

          (* Final polynomial *)
          poly[x_] = Sum[fi[[k]] * L[k, x], {k, 1, n}];
          poly[x]
         ]
```

Question 1 :

```
In[100]:=
          nodes = {0, 1, 3};
          values = {1, 3, 55};
          P[x_] = LagrangeInterpolation[nodes, values];
          Expand[P[x]]
```

Out[103]=

$1 - 6 x + 8 x^2$

Question 2 :

```
In[104]:=
          nodes = {0, 1, 3};
          values = {1, 3};
          P[x_] = LagrangeInterpolation[nodes, values]
```

List of points and function's values are not of same size

Question 3 :

In[107]:=

```
nodes = {1, 3, 5, 7, 9};
values = N[Log /@ nodes];

P[x_] = LagrangeInterpolation[nodes, values];
Simplify[P[x]]

Plot[{P[x], Log[x]}, {x, 1, 10},
 PlotLegends → {"LagrangePolynomial(x)", "log(x)"}
]
```
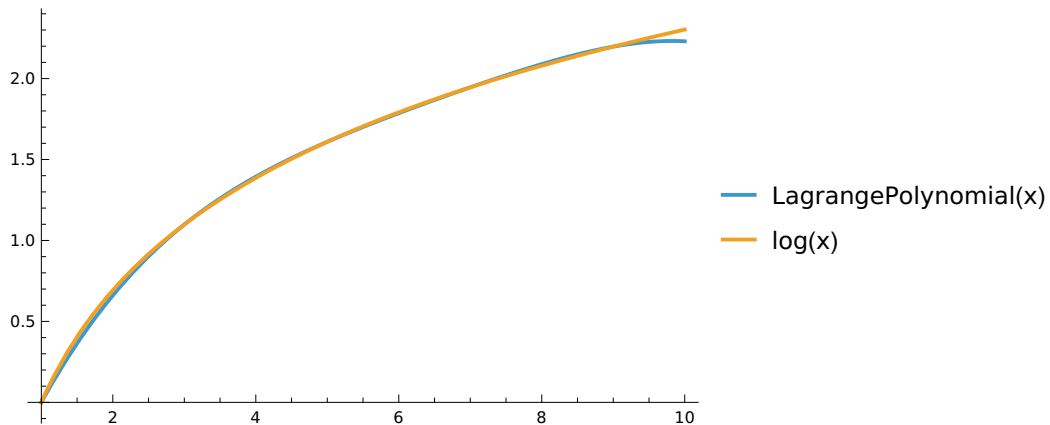
Out[110]=

$$-0.987583 + 1.18991 x - 0.223608 x^2 + 0.0221231 x^3 - 0.000844369 x^4$$

Out[111]=

Question 4 :

In[112]:=

```
nodes = {-1, 0, 1, 2};
values = {5, 1, 1, 11};

P[x_] = LagrangeInterpolation[nodes, values]
Simplify[P[x]]

P[1.5]
```

Out[114]=

$$-\frac{5}{6} (1-x)(2-x) x + \frac{1}{2} (1-x)(2-x)(1+x) + \frac{1}{2} (2-x) x (1+x) + \frac{11}{6} (-1+x) x (1+x)$$

Out[115]=

$$1 - 3 x + 2 x^2 + x^3$$

Out[116]=

4.375